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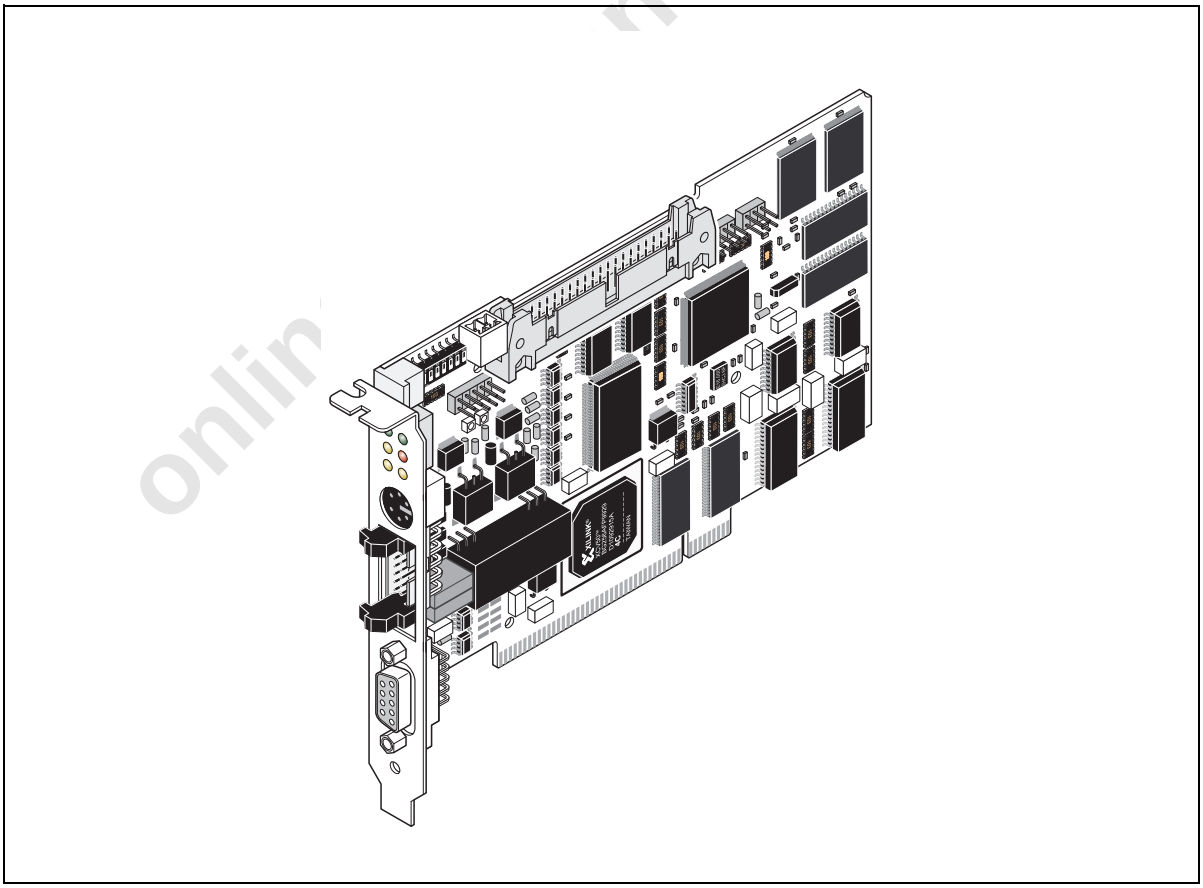
AUTOMATIONWORX

User Manual

IBS PCI SC QS UM E

Order No.: 2698148

Installing and Starting Up the Controller Board for PC Systems



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AUTOMATIONWORX

User Manual

Installing and Starting Up the Controller Board for PC Systems

03/2006

Designation: IBS PCI SC QS UM E

Revision: 03

Order No.: 2698148

This user manual is valid for:

IBS PCI SC/I-T	Order No. 2725260
IBS PCI SC/RI-LK	Order No. 2730187
IBS PCI SC/RI/I-T	Order No. 2730080

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Section 1

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1 Preface

1.1 Application

This user manual helps you to start up and operate a controller board or a system coupler for PCs with PCI bus. It is assumed the user has knowledge and experience in the operation of PCs and the Windows NT 4.0 operating system.

1.2 Contents

This manual describes the easy startup of an INTERBUS system as follows:

1. Hardware installation
2. Driver software installation

1.3 Hardware and Software Requirements

– Controller board
  IBS PCI SC/I-T Order No. 27 25 26 0
– System coupler
  IBS PCI SC/RI-LK Order No. 27 30 18 7
  IBS PCI SC/RI/I-T Order No. 27 30 08 0
– Minimum PC requirements:
  Pentium processor with 200 MHz
  32 MB main memory (RAM)
  30 MB free hard disk space
  One free PCI slot, according to specification 2.1 or later
  (two free slots for system coupler)
  Microsoft Windows NT 4.0

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1.4 Additional Documentation

Driver and documentation CD for the controller board
CD IBS PCI SC Order No. 27 33 00 3

"Configuring and Installing INTERBUS" User Manual
IBS SYS PRO INST UM E Order No. 27 43 80 2

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– the hardware installation of the IBS PCI SC/I I-T controller board.

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2 IBS PCI SC/I-T Hardware Installation

2.1 Unpacking the Controller Board

The controller board is supplied in an ESD bag.

To avoid possible damage to the board and the PC, unpack and pack the board, and insert it in the PC in accordance with ESD regulations.

2.1.1 ESD Regulations

Observe the necessary safety measures when handling components that may be damaged by electrostatic discharge.

Persons who handle the controller board must protect it by observing the ESD instructions before packing or unpacking the board, opening control boxes or control cabinets, and before touching the board.

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2.2 Structure of the Controller Board

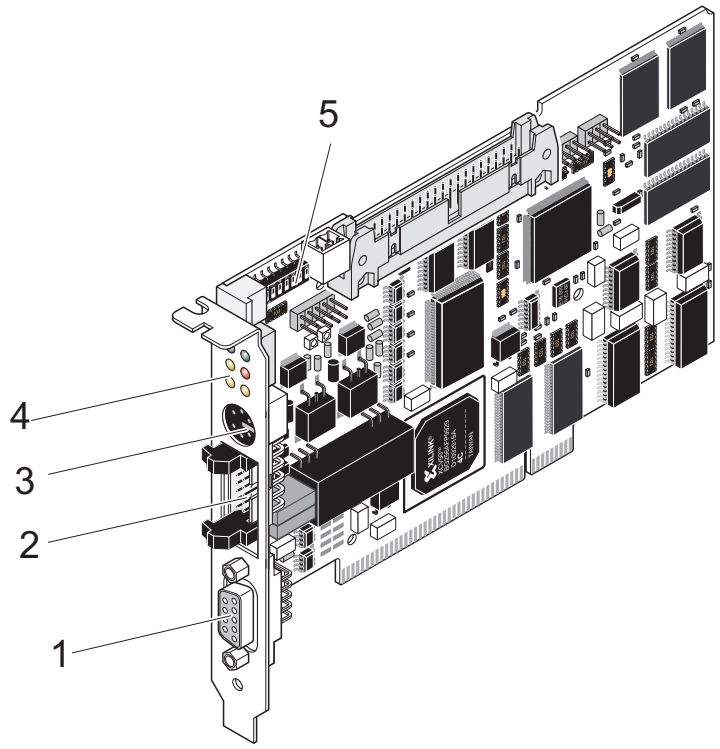

Figure 2-1 Structure of the IBS PCI SC/I-T controller board

The controller board has the following components:

1 INTERBUS remote bus interface

2 Connection for direct inputs and outputs (is not supported at present)

3 RS-232 interface

4 Diagnostic LEDs (indicators)

5 DIP switches for setting the board number

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2.2.1 Display Elements of the Controller Board

The basic functions are checked when the controller board is switched on. If there are no errors, the green SC LED flashes after approximately 5 seconds. If the HF LED goes out, the driver for the controller board is active. The status of the INTERBUS bus system is indicated by other LEDs.

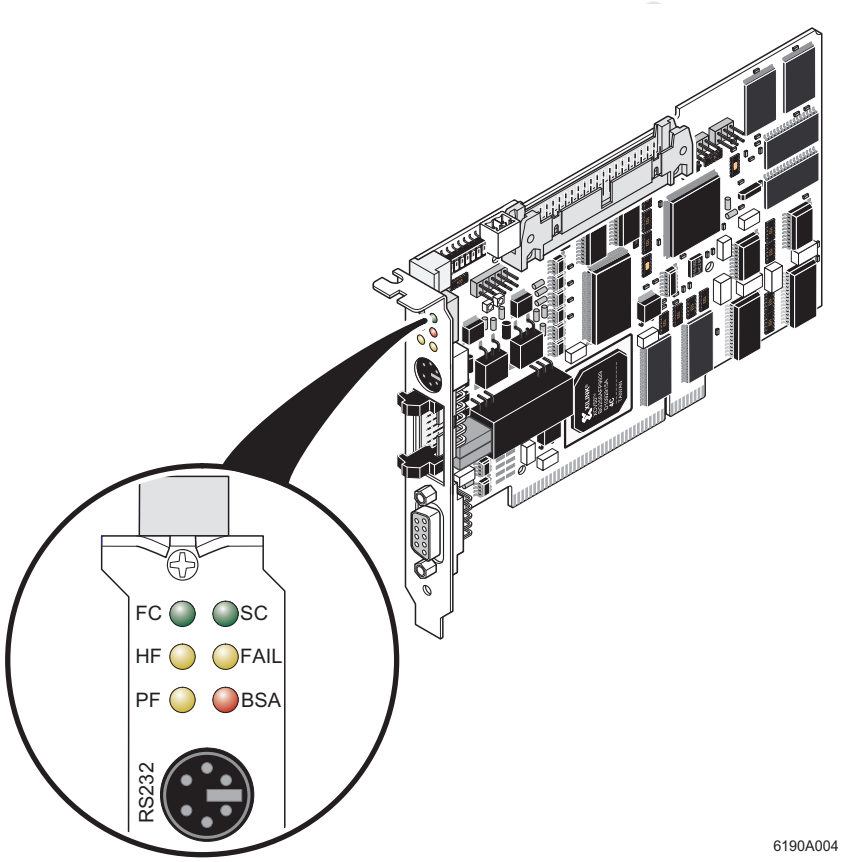

Figure 2-2 IBS PCI SC/I-T indicators

The meaning and the color of the indicators are shown in Table 2-1:

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Table 2-1 IBS PCI SC/I-T indicators

Des.	Color	Meaning
FC	**Green**	Reserved
SC	**Green** Flashing: ON:	**INTERBUS ready/running** The controller board is in READY or ACTIVE state The controller board and the connected INTERBUS are in the RUN state
HF	**Yellow** ON:	**Host failure** Host system failure; driver not yet started
FAIL	**Red** ON	**Failure** Error has occurred in the INTERBUS system
PF	**Yellow** ON:	**Peripheral failure** Peripheral failure of an INTERBUS device
BSA	**Yellow** ON:	**Bus segment aborted** One or more bus segments are disconnected

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2.2.2 Serial RS-232 Interface (Mini-DIN Female Connector)

The serial RS-232 interface is a 6-pos. Mini-DIN female connector (PS/2) on the slot plate. The board is connected to the PC with the RS-232 cable PRG CAB MINI-DIN (Order No. 27 30 61 1) as shown in the following.

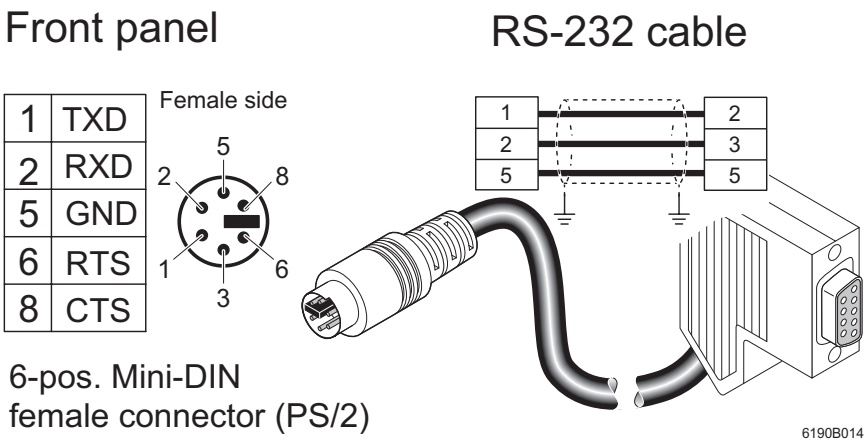

Figure 2-3 Diagnostic interface and RS-232 cable for connection to a PC

With the *IBS CMD SWT G4 E* software, the user can configure, parameterize, and diagnose the INTERBUS system. Parameterization and configuration information can be stored permanently on the controller board using *IBS CMD SWT G4 E*. In addition, the firmware of the controller board can be downloaded via the serial interface (RS-232). In this way, it is possible to meet future system requirements by means of updates.

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2.3 Setting Up the Controller Board

2.3.1 DIP Switches for Setting the Board Number

If several INTERBUS PCI boards are used in a PC, each board must be given a number. The numbers differentiate the boards in the system. DIP switches 1 ... 3 for setting the board number are on the upper edge of the board. The board number can be set anywhere between 1 and 8. The default value (upon delivery) is 1. If only one INTERBUS PCI board is used, the board number does not need to be changed.

Make a note of the board number because this number must be entered when installing the driver.

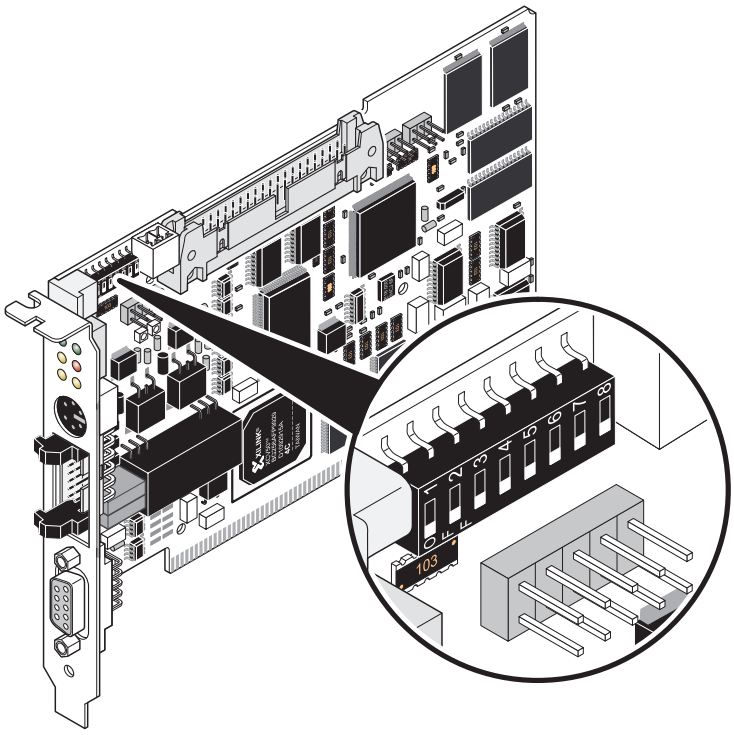

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Figure 2-4 Default settings of the DIP switches (board number 1)

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Table 2-2 DIP switches for setting the board number

Board Number	DIP Switch 1	DIP Switch 2	DIP Switch 3	
1	**OFF**	**OFF**	**OFF**	**Default**
2	ON	OFF	OFF	
3	OFF	ON	OFF	
4	ON	ON	OFF	
5	OFF	OFF	ON	
6	ON	OFF	ON	
7	OFF	ON	ON	
8	ON	ON	ON	

DIP switches 4 ... 7 are reserved for extensions, and must not be changed.

DIP switch 8 (test mode) is not used for setting board numbers. It is used to activate test mode. When the controller board is restarted with activated test mode, it starts the INTERBUS system with physical addressing, and initializes it. During test mode the controller board does not respond to instructions of the host system (PC). The controller board initializes the INTERBUS system, and then operates it independently. Outputs are not set.

Test mode is not intended for normal operation of the controller board. Set switch 8 to OFF to deactivate test mode.

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2.4 Installing the Controller Board

2.4.1 Installing the Controller Board in the PC

Switch off the PC and disconnect the mains plug before opening the PC casing.

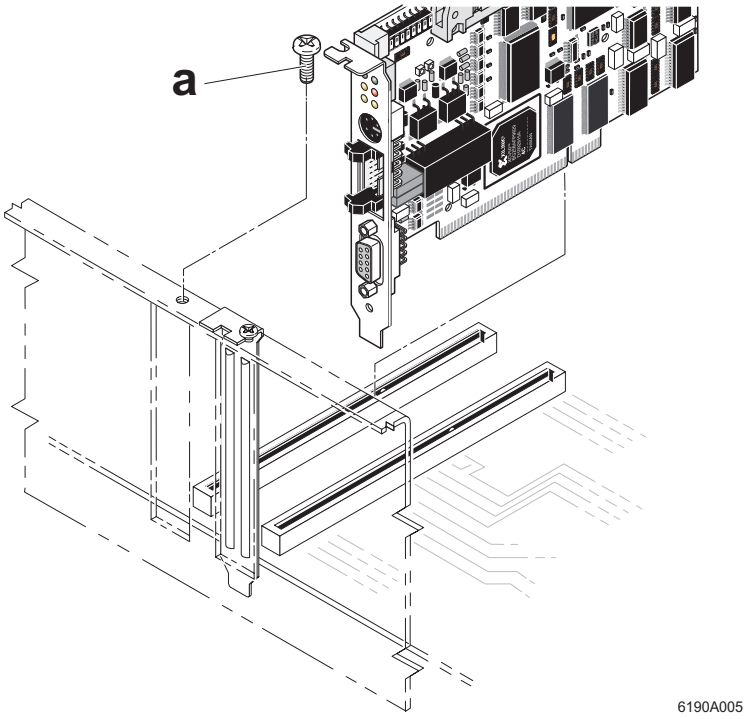

Figure 2-5 Installing the controller board in the PC

The controller board needs one PCI bus slot in the PC. The power consumption of the controller board is 3.5 W at 5 V (typical).

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1. Ensure that you are grounded before installing the board in the PC casing.
2. Power down and disconnect the mains plug.
3. Open the PC.
4. Insert the controller board in the PCI bus slot, make sure that the system connector is well-contacted and the board is securely placed.
5. Secure the module using the mounting screw (a) (see Figure 2-5).

To ensure error-free operation, the mounting plate of the module must be fastened to the PC casing. The PC casing must be grounded in compliance with the regulations.

6. Close the PC.
7. Plug in the PC and switch it on again.

Now the controller board is completely installed in your PC.

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2.4.2 Bus System Connection

Connect the outgoing INTERBUS remote bus cable to the "REMOTE OUT" connection of the controller board (see Figure 2-6).

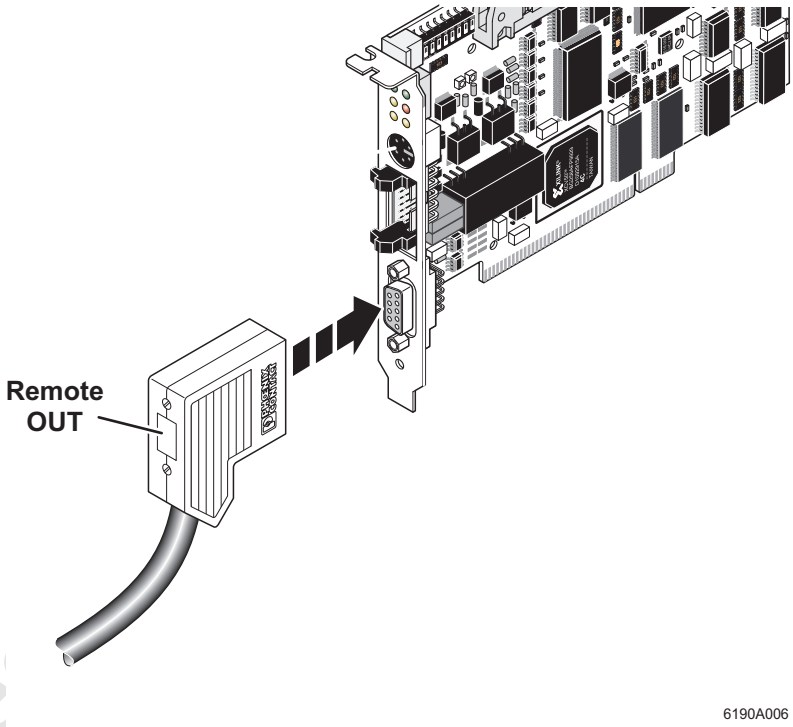

Figure 2-6 Connecting the INTERBUS remote bus cable

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Section 3

This section informs you about

– the hardware installation of the IBS PCI SC/RI-LK and IBS PCI SC/RI/I-T system couplers.

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3 IBS PCI SC/RI-LK and IBS PCI SC/RI/I-T Hardware Installation

Because the IBS PCI SC/RI-LK and IBS PCI SC/RI/I-T system couplers basically have the same structure and only differ in their INTERBUS connections, the following section only describes the system coupler with an optical fiber connection (Order designation IBS PCI SC/RI-LK).

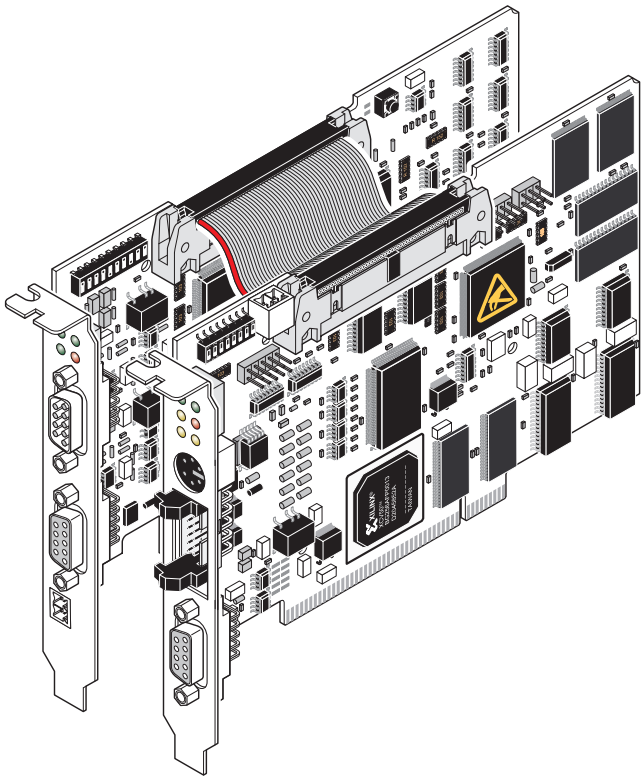

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Figure 3-1 IBS PCI SC/RI/I-T system coupler

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3.1 Unpacking the System Coupler

The system coupler is supplied in an ESD bag.

To avoid possible damage to the system coupler and the PC, unpack and pack the system coupler, and insert it in the PC in accordance with ESD regulations.

3.1.1 ESD Regulations

Observe the necessary safety measures when handling components that may be damaged by electrostatic discharge.

Persons who handle the system coupler must protect it by observing the ESD instructions before packing or unpacking the system coupler, opening control boxes or control cabinets, and before touching the system coupler.

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3.2 Structure of the System Coupler

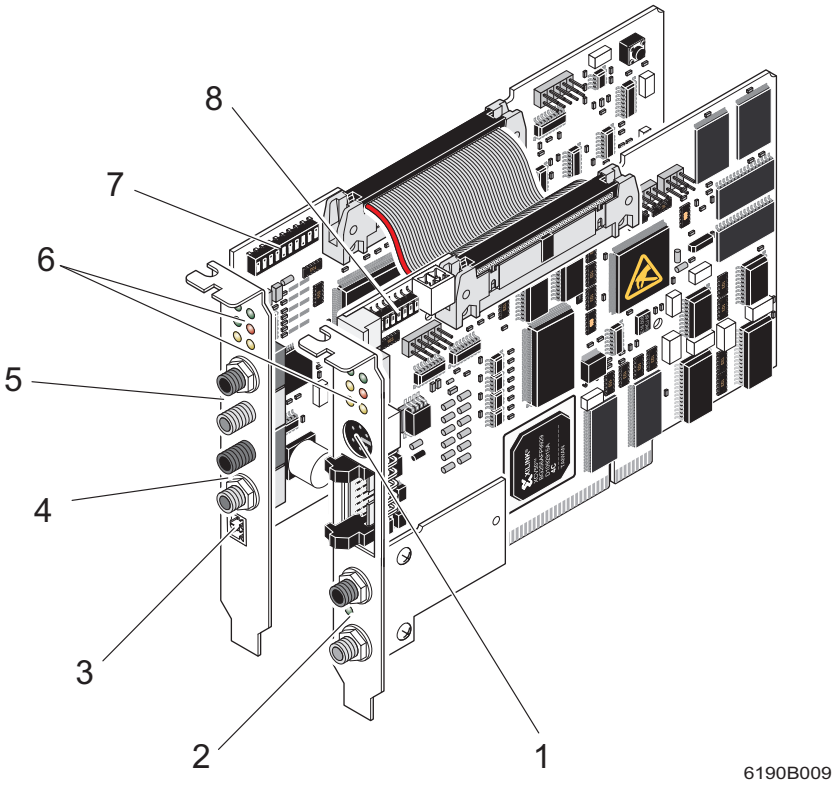

Figure 3-2 Structure of the IBS PCI SC/RI-LK system coupler

The system coupler has the following components:

1 RS-232 interface
2 Master interface (Remote OUT, outgoing remote bus)
3 Connection of the external 24 V supply voltage for the slave part
4 Slave interface (Remote OUT, outgoing remote bus)
5 Slave interface (Remote IN, incoming remote bus)
6 Diagnostic LEDs (indicators)
7 DIP switches for the slave configuration
8 DIP switches for the master configuration

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3.2.1 System Coupler Indicators

Master Board

When the system coupler is switched on, the processor and the firmware of the master board are checked for the required basic functions. If there are no errors, the green SC LED flashes after approximately 5 seconds. If the HF LED goes out, the driver for the system coupler is active. The meaning and the color of the indicators are shown in the following table:

Table 3-1 IBS PCI SC/RI-LK master board indicators

Des.	Color	Meaning
FC	**Green**	Reserved
SC	**Green** Flashing: ON:	**INTERBUS ready/running** The controller board is in READY or ACTIVE state The controller board and the connected INTERBUS are in the RUN state
HF	**Yellow** ON:	**Host failure** Host system failure; driver not yet started
FAIL	**Red** ON	**Failure** Error has occurred in the INTERBUS system
PF	**Yellow** ON:	**Peripheral failure** Peripheral failure of an INTERBUS device
BSA	**Yellow** ON:	**Bus segment aborted** One or more bus segments are disconnected

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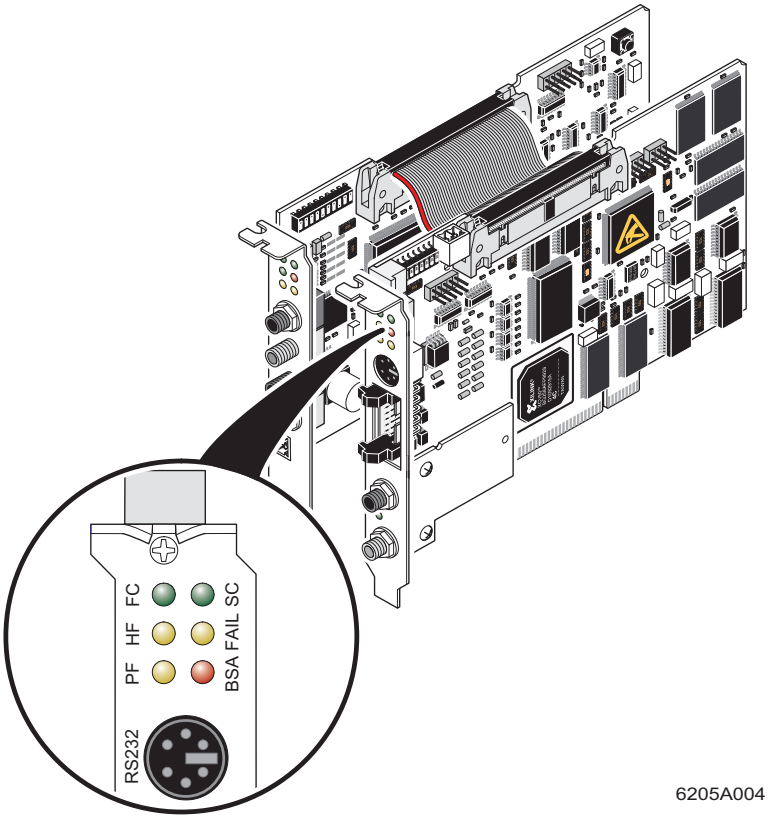

Figure 3-3 Master board LED indicators

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The system coupler with an optical fiber interface (IBS PCI SC/RI-LK) also has an LED to diagnose the outgoing optical fiber interface:

Table 3-2 LED to diagnose the outgoing optical fiber interface

Des.	Color	Meaning
FO3	**Yellow** ON:	**Fiber optic 3** The FO3 LED is on if the initialization of the outgoing interface is not OK or if a MAU warning occurs due to poor transmission quality on the path (this applies to the data forward path/transmitter for the following module, the state of the data return path/receiver is diagnosed from the following module).

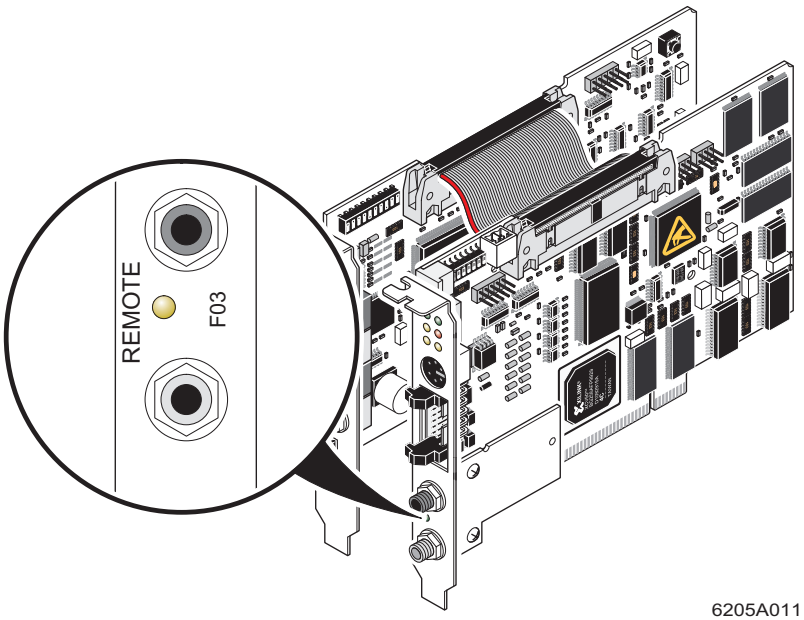

Figure 3-4 LED to diagnose the outgoing optical fiber interface

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Slave Expansion Module

The LED indicators on the slave expansion module provide information on the state of the higher-level INTERBUS system and the slave expansion module.

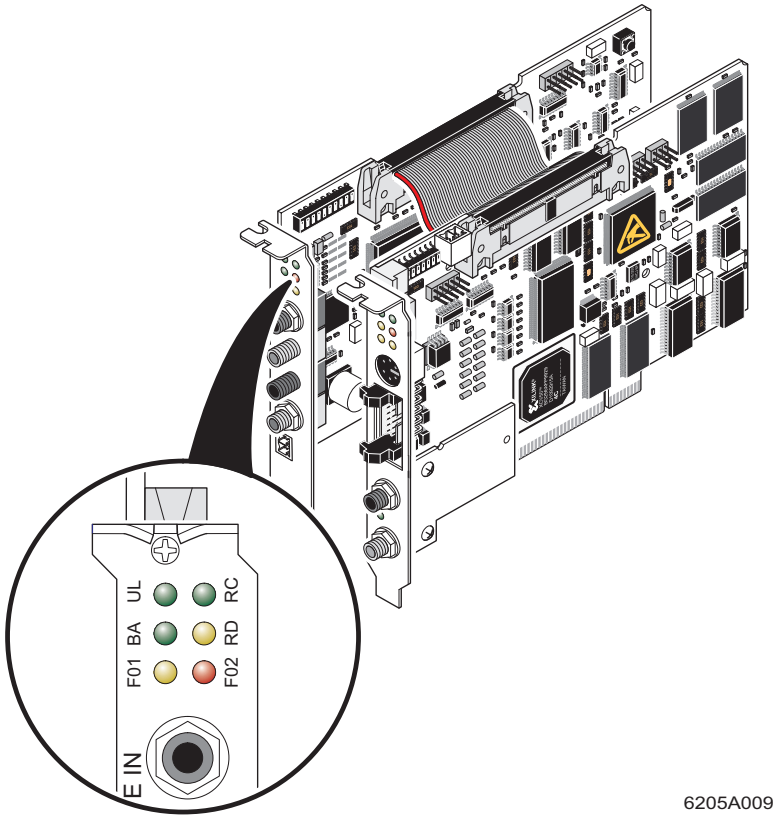

Figure 3-5 Slave expansion module LED indicators

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The meanings of the LEDs can be found in the following table:

Table 3-3 IBS PCI SC/RI-LK slave module indicators

Des.	Color	Meaning
UL	**Green** ON:	**U (Logic)** Operating voltage present
RC	**Green** ON:	**Remote bus check** The higher-level controller board is connected
BA	**Green** Flashing: ON:	**Bus active** Bus is in the ACTIVE state Bus is in the RUN state
RD	**Red** ON:	**Remote bus disabled** The outgoing remote bus interface is disconnected
FO1	**Yellow** ON:	**Fiber optic 1** The FO1 LED is on if the initialization of the incoming interface is not OK or if an MAU warning occurs due to poor transmission quality on the path (this applies to the data return path/transmitter for the previous module, the state of the data forward path/receiver is diagnosed from the previous module).
FO2	**Yellow** ON:	**Fiber optic 2** The FO2 LED is on if the initialization of the outgoing interface is not OK or if an MAU warning occurs due to poor transmission quality on the path (this applies to the data forward path/transmitter for the following module, the state of the data return path/receiver is diagnosed from the following module).

The FO1 and FO2 LEDs are not available on the system coupler with D-SUB interface (IBS PCI SC/RI/I-T).

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3.2.2 Serial RS-232 Interface (Mini-DIN Female Connector)

The serial RS-232 interface is a 6-pos. Mini-DIN female connector (PS/2) on the slot plate. The board is connected to the PC with the RS-232 cable PRG CAB MINI-DIN (Order No. 27 30 61 1) as shown in the following.

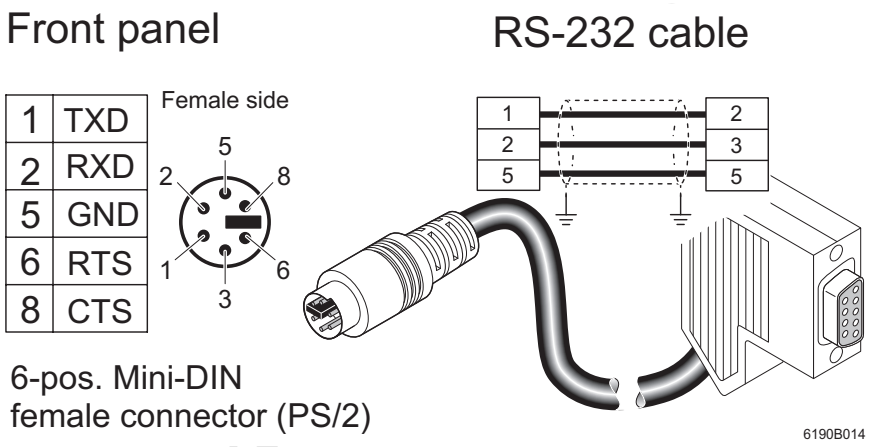

Figure 3-6 Diagnostic interface and RS-232 cable for connection to a PC

With the *IBS CMD SWT G4 E* software, the user can configure, parameterize, and diagnose the INTERBUS system. Parameterization and configuration information can be stored permanently on the controller board using *IBS CMD SWT G4 E*. In addition, the firmware of the controller board can be downloaded via the serial interface (RS-232). In this way, it is possible to meet future system requirements by means of updates.

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3.3 Setting Up the System Coupler

3.3.1 DIP Switches for Setting the Board Number

If several INTERBUS PCI boards are used in a PC, each board must be given a number. The numbers differentiate the boards in the system. DIP switches 1 ... 3 for setting the board number are on the upper edge of the board. The board number can be set anywhere between 1 and 8 (binary encoded). The default value (upon delivery) is 1. If only one INTERBUS PCI board is used, the board number does not need to be changed.

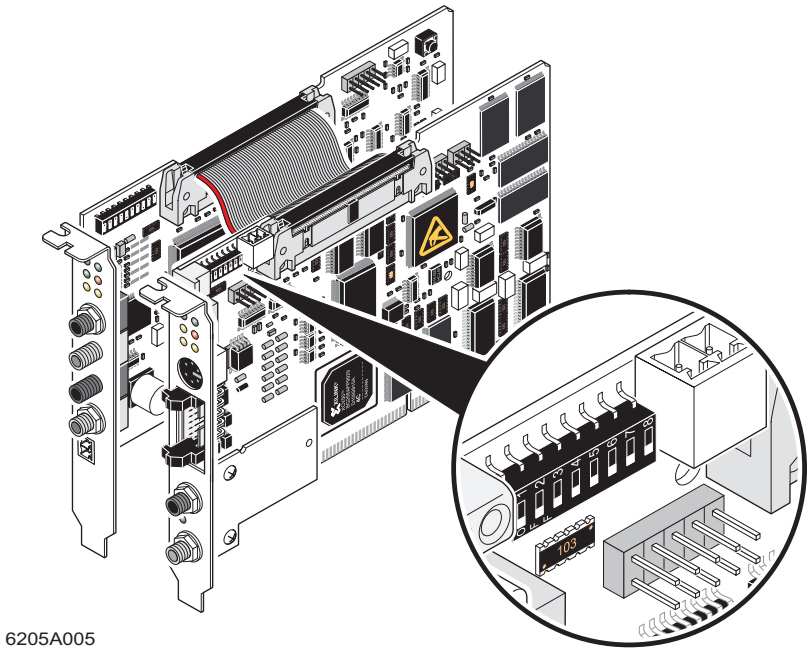

Figure 3-7 Default settings of the DIP switches (board number 1)

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Table 3-4 DIP switches for setting the board number

Board Number	DIP Switch 1	DIP Switch 2	DIP Switch 3	
1	**OFF**	**OFF**	**OFF**	**Default**
2	ON	OFF	OFF	
3	OFF	ON	OFF	
4	ON	ON	OFF	
5	OFF	OFF	ON	
6	ON	OFF	ON	
7	OFF	ON	ON	
8	ON	ON	ON	

DIP switches 4, 5, 6, and 8 are reserved for extensions, and must not be changed.

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3.3.2 DIP Switch for Selecting the Baud Rate

The baud rate of the lower-level INTERBUS system can be set using DIP switch 7 of the master board. The default upon delivery (switch position "OFF") is 500 kbaud. Alternatively, 2 Mbaud (switch position "ON") can be set.

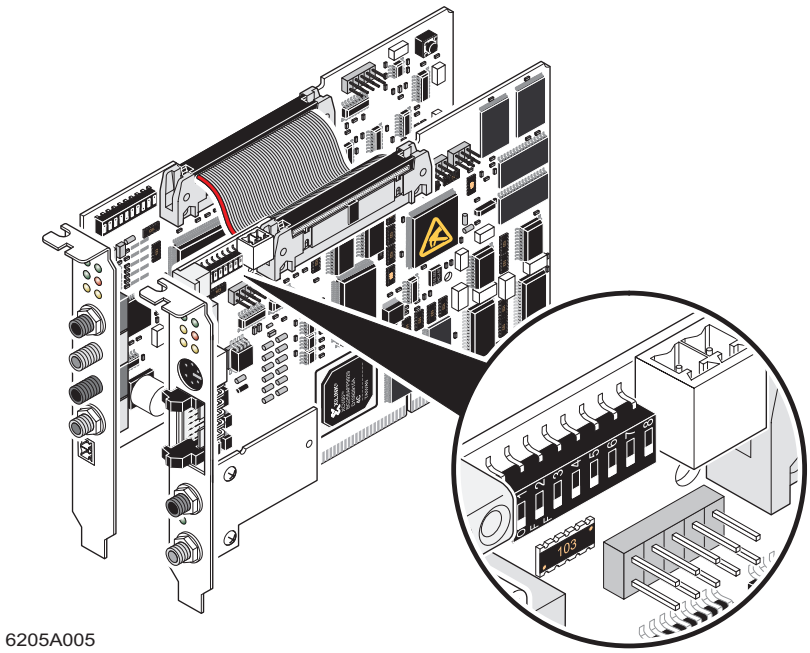

Figure 3-8 DIP switch for selecting the baud rate

With the IBS PCI SC/RI/I-T system coupler, the baud rate is selected automatically. Therefore DIP switch 7 does not have to be set.

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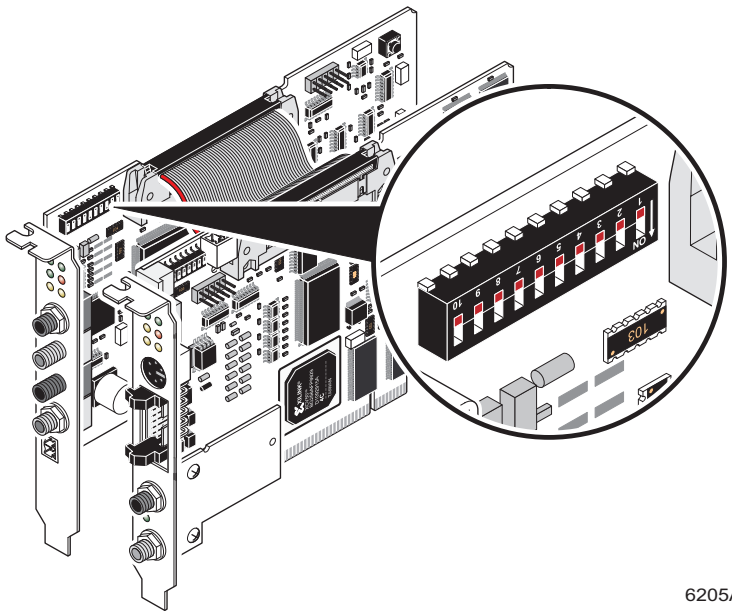
3.3.3 DIP Switches for Setting Up the Slave Expansion Module

The DIP switches are located at the top left of the slave expansion module. These DIP switches are used to configure the slave part of the system coupler.



6205A010

Figure 3-9 DIP switches on the slave expansion module

The DIP switch settings are overwritten by the host PC by means of software configuration if DIP switch 10 is in the "OFF" position. For further information on the system coupler configuration, please refer to Section 5 „Behavior of the IBS PCI SC/RI-LK and IBS PCI SC/RI/I-T System Couplers“.

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DIP Switches 1 and 2: Setting the Parameter Channel (PCP)

The width of the parameter channel is set using DIP switches 1 and 2. This setting also determines the ID code of the remote interface.

The maximum combined width of the parameter channel and the process data channel is 16 words.

Table 3-5 Setting the parameter channel (PCP)

DIP Switch 1	DIP Switch 2	Parameter Channel (PCP)	ID Code
OFF	OFF	0 words	3_{dec}
ON	OFF	1 word	235_{dec}
OFF	ON	2 words	232_{dec}
ON	ON	4 words	233_{dec}

DIP Switches 3 ... 6: Setting the Process Data Length

The length of the process data is set using DIP switches 3 ... 6.

These DIP switches are also used to specify the length code.

Table 3-6 Setting the process data length

DIP Switches				Process Data	Length Code
3	4	5	6		
OFF	OFF	OFF	OFF	0 words	$00_{hex}/0_{dec}$
ON	OFF	OFF	OFF	1 word	$01_{hex}/1_{dec}$
OFF	ON	OFF	OFF	2 words	$02_{hex}/2_{dec}$
ON	ON	OFF	OFF	3 words	$03_{hex}/3_{dec}$
OFF	OFF	ON	OFF	4 words	$04_{hex}/4_{dec}$
ON	OFF	ON	OFF	5 words	$05_{hex}/5_{dec}$
OFF	ON	ON	OFF	6 words	$06_{hex}/6_{dec}$
ON	ON	ON	OFF	7 words	$07_{hex}/7_{dec}$
OFF	OFF	OFF	ON	8 words	$08_{hex}/8_{dec}$

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Table 3-6 Setting the process data length

DIP Switches				Process Data	Length Code
3	4	5	6		
ON	OFF	OFF	ON	9 words	$09_{hex}/9_{dec}$
OFF	ON	OFF	ON	10 words	$0A_{hex}/10_{dec}$
ON	ON	OFF	ON	11 words	$0B_{hex}/11_{dec}$
OFF	OFF	ON	ON	12 words	$0C_{hex}/12_{dec}$
ON	OFF	ON	ON	13 words	$0D_{hex}/13_{dec}$
OFF	ON	ON	ON	14 words	$0E_{hex}/14_{dec}$
ON	ON	ON	ON	16 words	$10_{hex}/16_{dec}$

By setting the width of the parameter channel and the process data length, you can adapt the module to meet your requirements. The following combinations are available:

Table 3-7 Width of the parameter channel and the process data length

Parameter Channel	Process Data Length (in Words)															
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16
0 words		✔	✔	✔	✔	✔	✔	✔	✔	✔	✔		✔		✔	✔
1 word	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔		✔		✔		
2 words	✔	✔	✔	✔	✔	✔	✔	✔	✔		✔		✔		✔	
4 words	✔	✔	✔	✔	✔	✔	✔		✔		✔		✔			

If you change the configuration of the slave expansion module using DIP switches, the new configuration is only accepted once the slave expansion module, the master part, and the host system have been powered up **simultaneously**.

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DIP Switch 7: Reset Behavior on a Host PC Reset

DIP switch 7 can be used to specify whether a lower-level master system reset triggers an I/O error in the higher-level system. In the "OFF" position (default upon delivery) a message is generated so that the higher-level system can respond. If the switch is in the "ON" position no message is sent to the higher-level system.

DIP Switch 8: Reserved

DIP switch 8 is reserved. Do not change the switch position.

DIP Switch 9: Setting the Baud Rate

DIP switch 9 sets the baud rate of the system coupler slave part. In the "OFF" position the baud rate is 500 kbaud (default value), and in the "ON" position the baud rate is 2 Mbaud.

DIP Switch 10: Configuration

DIP switch 10 is of particular significance. If the switch is in the "ON" position, the system coupler slave part is configured according to the switch positions of DIP switches 1 to 9. If the switch is in the "OFF" position, switch positions 1 ... 9 are ignored, and the slave part is parameterized using a stored configuration or a configuration received from the lower-level master.

Therefore only set DIP switch 10 to the "ON" position when starting up your INTERBUS system or if, for example, you want to check the cabling. For normal operation it is recommended that DIP switch 10 is in the "OFF" position and configuration is carried out using software.

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3.4 Installing the System Coupler

3.4.1 External Voltage Supply

To operate the system coupler, the slave expansion module must also be supplied with an external 24 V DC supply voltage. The power consumption of the slave expansion module is 3.5 W (typical).

The supply voltage is connected with a 2-pos. MINI-COMBICON connector.

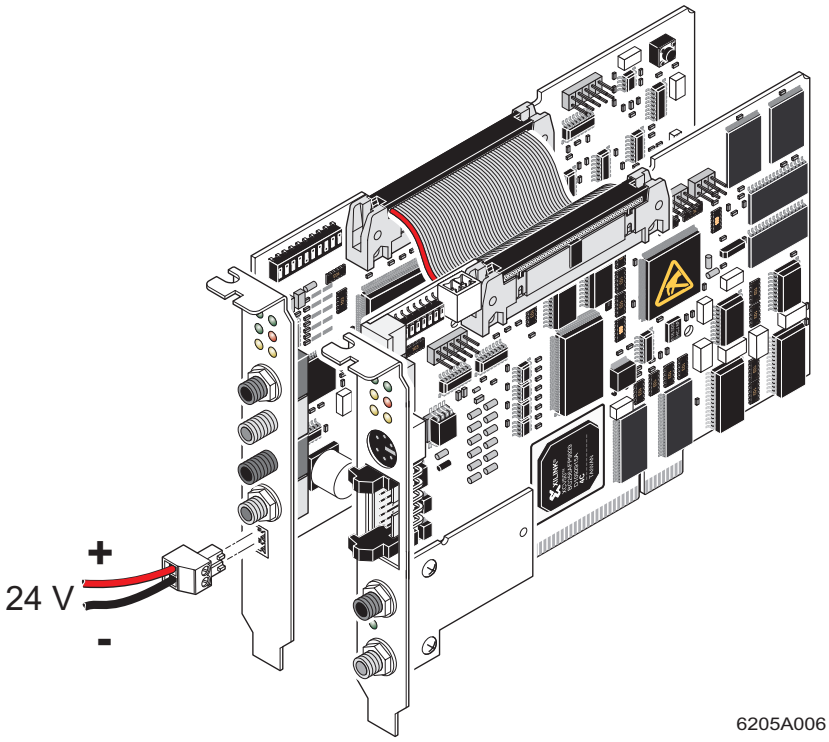

Figure 3-10 Connecting the external voltage supply for the slave expansion module

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3.4.2 Installing the System Coupler in the PC

Switch off the PC and disconnect the mains plug before opening the PC casing.

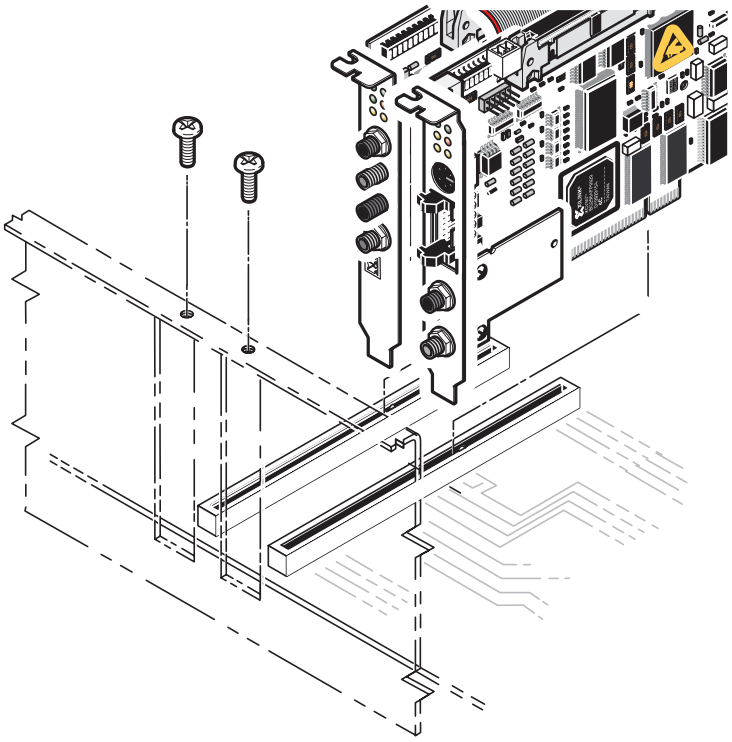

Figure 3-11 Installing the system coupler in the PC

The system coupler needs two PCI bus slots in the PC. The power consumption of the system coupler is 6.5 W at 5 V (typical).

If only one PCI slot and another adjacent slot are free, the PCI system connector can be removed from the slave expansion module and the module can be mounted in the free slot. Ensure that the module is secure.

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1. Ensure that you are grounded before installing the system coupler in the PC casing.
2. Power down and disconnect the mains plug.
3. Open the PC.
4. Insert the system coupler in the slots. Ensure that the system connector is well-contacted and the system coupler is securely placed.
5. Secure the system coupler using the mounting screws (see Figure 3-11).

To ensure error-free operation, the mounting plate of the system coupler must be fastened to the PC casing. The PC casing must be grounded in compliance with the regulations.

6. Close the PC.
7. Plug in the PC and switch it on again.

Now the system coupler is completely installed in your PC.

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3.4.3 Bus System Connection

The optical fiber cable for the remote bus must be fitted with appropriate F-SMA connectors. HCS fiber cables and polymer fiber cables can be used as optical fiber cables (see table "Comparison of polymer fibers and HCS fibers" on page A-2).

Plug the connectors into the sockets provided and secure the connections with the cap nuts. "Remote IN" indicates the connection for the incoming remote bus, while "Remote OUT" indicates the connection for the outgoing remote bus of the slave interface. On the lower-level master "Remote OUT" indicates the master interface.

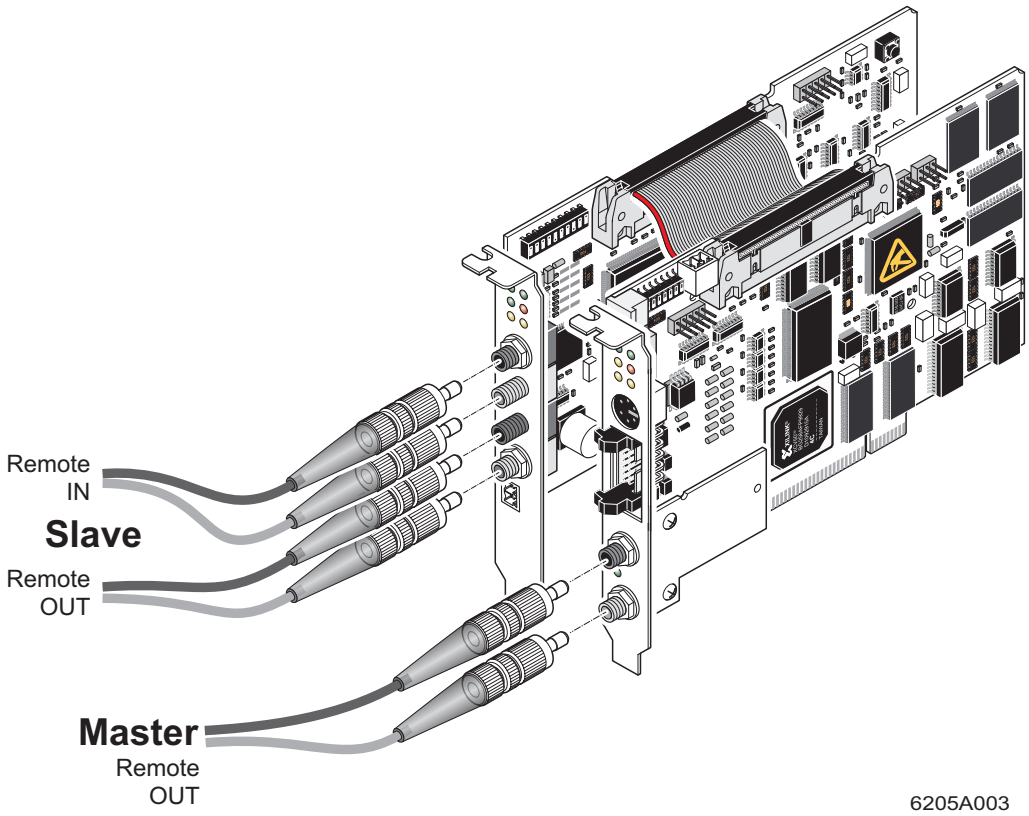

Figure 3-12 Connecting the bus system via optical fibers

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Section 4

This section informs you about
– the driver installation.

Software 4-3

4.1 Installing the Driver for Windows NT 4.0 4-3

4.2 Installing the Driver for Windows 2000 4-6

4.3 Installing Additional Tools 4-8

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4 Software

The Device Driver Interface (DDI) is also installed during the installation of the driver for the controller board. Additional information on the DDI can be found in the IBS PC SC SWD UM E Driver Reference Manual (Order No. 27 45 17 2), which is part of the System Manual.

4.1 Installing the Driver for Windows NT 4.0

To use this CD you need Microsoft Internet Explorer. You can install Microsoft Internet Explorer 5.5 from the "[drive:\IE55]" directory of the CD.

1. Insert the CD with the driver for Windows NT 4.0. The CD starts automatically.

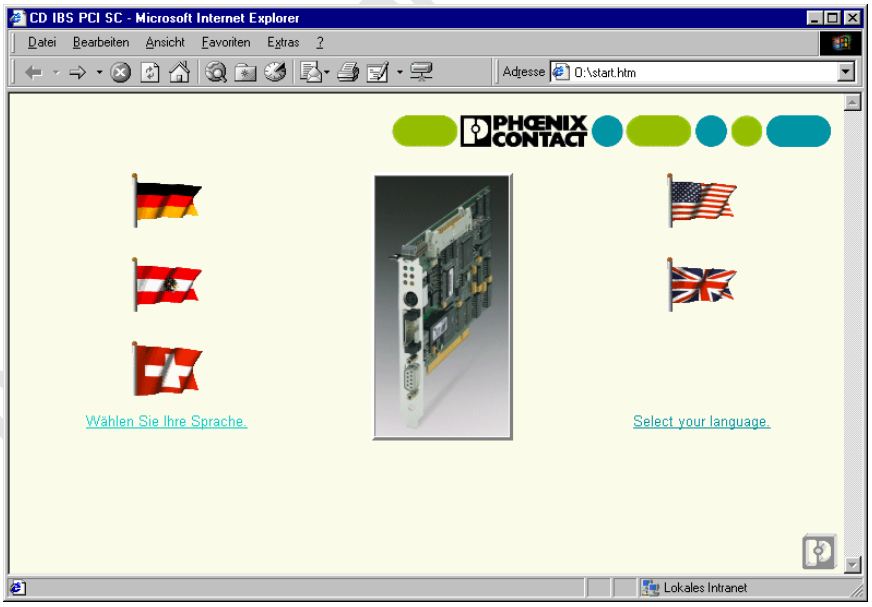

Figure 4-1 Start page of the IBS PCI SC CD-ROM

2. Now select the language.

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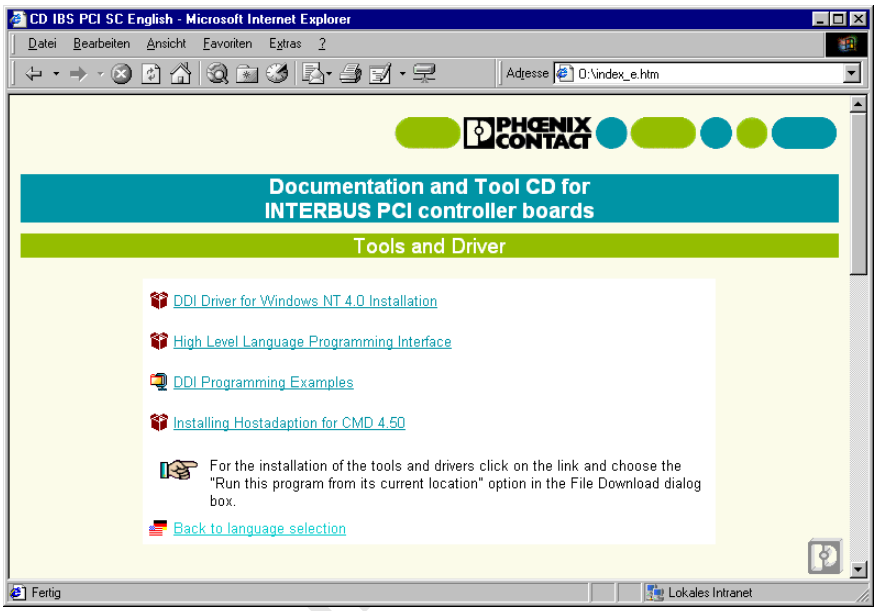
CD IBS PCI SC English - Microsoft Internet Explorer
Datei Bearbeiten Ansicht Favoriten Extras ?
Adresse D:\index_e.htm
PHOENIX CONTACT
Documentation and Tool CD for
INTERBUS PCI controller boards
Tools and Driver
DDI Driver for Windows NT 4.0 Installation
High Level Language Programming Interface
DDI Programming Examples
Installing Hostadaption for CMD 4.50
For the installation of the tools and drivers click on the link and choose the "Run this program from its current location" option in the File Download dialog box.
Back to language selection
Fertig
Lokales Intranet

Figure 4-2 Tools and driver on the IBS PCI SC CD-ROM

3. Click on "Driver for Windows NT 4.0" in the "Tools and Driver" section.

To install the driver and other tools, select "Run this program from its current location" in the "File Download" dialog box.

4. Driver installation is now completed.

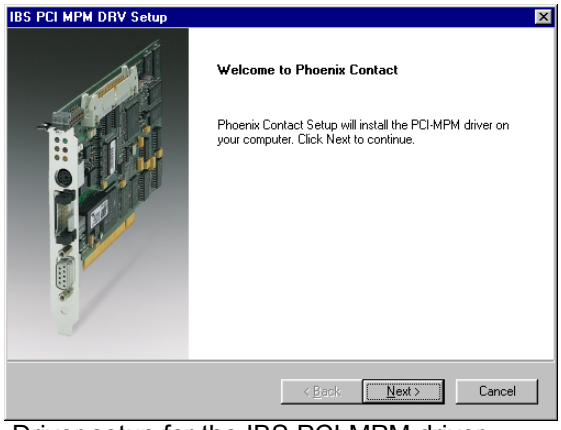
IBS PCI MPM DRV Setup
Welcome to Phoenix Contact
Phoenix Contact Setup will install the PCI-MPM driver on your computer. Click Next to continue.
< Back
Next >
Cancel

Figure 4-3 Driver setup for the IBS PCI MPM driver

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5. Now follow the instructions on the screen.

During driver installation, enter the board number set using the DIP switches. Information on this can be found in "DIP Switches for Setting the Board Number" on page 2-8 and page 3-12.

6. Restart the computer.

If you want to change the driver settings, restart the driver setup.

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4.2 Installing the Driver for Windows 2000

Install the driver for Windows 2000 using the hardware assistant. If a new hardware was installed on the PC, the hardware assistant is activated automatically when Windows 2000 is started.

If the hardware assistant is not activated automatically after having installed a PCI controller board or a PCI system coupler you can start the hardware assistant from the Windows 2000 system control.

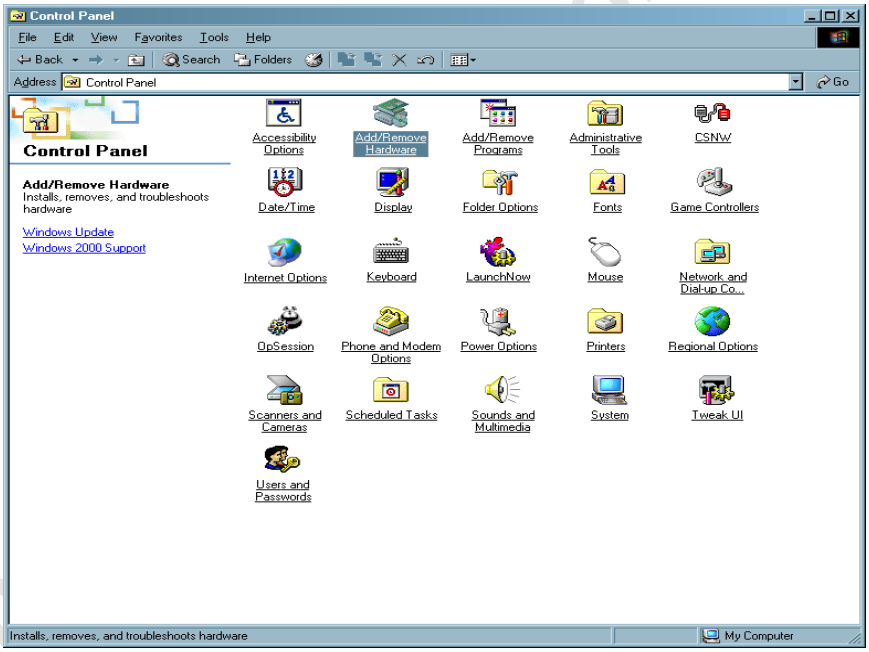

Figure 4-4 Windows 2000 control panel

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Add/Remove Hardware Wizard
Welcome to the Add/Remove Hardware Wizard
This wizard helps you add, remove, unplug, and troubleshoot your hardware.
To continue, click Next.
< Back
Next >
Cancel

Figure 4-5 Windows 2000 hardware assistant

When installing the driver, enter the board number set via DIP switch. For further information see section "DIP Switches for Setting the Board Number" on page 2-8 and page 3-12.

The include and header files from the "[Drive:\install\driver\win2000\ddi]" directory must be copied manually into the appropriate directory because the driver for Windows 2000 will be installed with the help of the hardware assistant.

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4.3 Installing Additional Tools

After installing the driver it is possible to:

– Install the High-Level Language Interface HLI to create individual applications in a high-level language or use one of the example programs.
– Install IBS CMD SWT G4 E software to configure, monitor, and diagnose your INTERBUS system or install the INTERBUS OPC server.

The High-Level Language Interface HLI and the example programs can be found on the supplied CD in the "[Drive:\Driver]" directory. The HLI and example programs are installed in the same way as the driver.

IBS CMD SWT G4 E software (Order No. 27 21 44 2) and the INTERBUS OPC server IBS OPC SERVER (Order No. 27 29 12 7) can be ordered from Phoenix Contact.

Complete documentation for the controller boards is also available in pdf format on the IBS PCI SC CD-ROM, in the "Documentation" section.

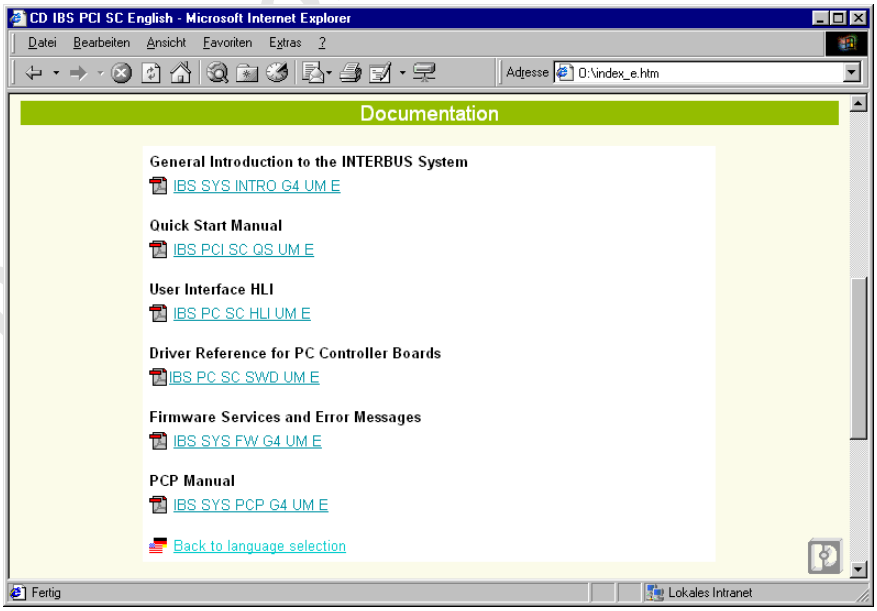
CD IBS PCI SC English - Microsoft Internet Explorer
Datei Bearbeiten Ansicht Favoriten Extras ?
Adresse D:\index_e.htm
Documentation
General Introduction to the INTERBUS System
IBS SYS INTRO G4 UM E
Quick Start Manual
IBS PCI SC QS UM E
User Interface HLI
IBS PC SC HLI UM E
Driver Reference for PC Controller Boards
IBS PC SC SWD UM E
Firmware Services and Error Messages
IBS SYS FW G4 UM E
PCP Manual
IBS SYS PCP G4 UM E
Back to language selection
Fertig
Lokales Intranet

Figure 4-6 Documentation on the IBS PCI SC CD-ROM

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Section 5

This section informs you about

– the system coupler configuration paths.

Behavior of the IBS PCI SC/RI-LK and IBS PCI SC/RI/I-T System Couplers 5-3

5.1 Start Behavior 5-3

5.1.1 Default Upon Delivery 5-3

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5.1.5 Changing the Configuration Using IBS CMD SWT G4 E 5-13

5.2 System Behavior and Diagnostics 5-14

5.2.1 Reset Behavior 5-14

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5.2.3 Data Behavior 5-16

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5 Behavior of the IBS PCI SC/RI-LK and IBS PCI SC/RI/I-T System Couplers

5.1 Start Behavior

The start behavior and the configuration of the system couplers is affected by:

– The DIP switches for setting up the slave expansion module (see section 3.3.3 on page 3-15).
– A configuration for the slave expansion module stored in the slave memory, which is loaded when the slave is powered up.
– A configuration for the system coupler stored in the master memory, which is loaded when the host system is powered up.
– Firmware services, which are sent to the system coupler by the host or higher-level INTERBUS system.

5.1.1 Default Upon Delivery

To ensure that the system couplers can be operated in the INTERBUS system, they must be parameterized to meet your requirements.

By default, the configuration is deactivated using the DIP switches on the slave expansion module and the slave part is configured using a configuration stored in the slave expansion module memory. The default upon delivery is **ID code 03_{dec}** and **16 process data words** in the higher-level INTERBUS system. The data transmission rate is **500 kbaud** and the I/O error message is active if the power for the master board fails.

The following diagram shows the basic sequence when starting the system couplers:

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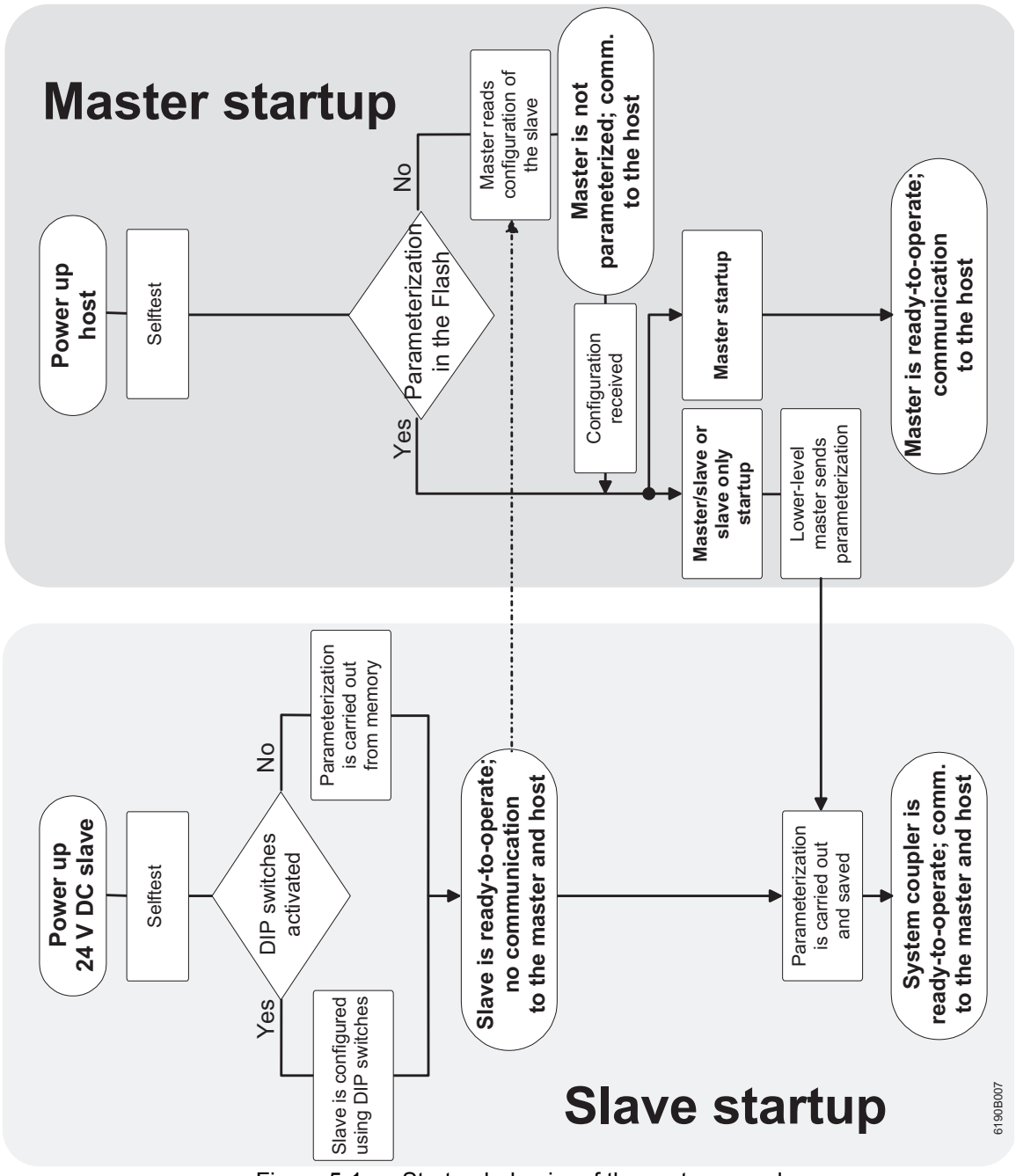
Master startup
Power up host
Selftest
Parameterization in the Flash
No
Yes
Master reads configuration of the slave
Master is not parameterized; comm. to the host
Configuration received
Master startup
Master is ready-to-operate; communication to the host
Master/slave or slave only startup
Lower-level master sends parameterization
Power up 24 V DC slave
Selftest
DIP switches activated
No
Yes
Parameterization is carried out from memory
Slave is configured using DIP switches
Slave is ready-to-operate; no communication to the master and host
Parameterization is carried out and saved
System coupler is ready-to-operate; comm. to the master and host
Slave startup
6190B007

Figure 5-1 Startup behavior of the system couplers

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5.1.2 Starting Up Without Parameterization of the Master

If the host system and the voltage supply for the slave expansion module are switched on, the slave and master part carry out a selftest independently from each other.

Next, the slave checks whether the DIP switches are activated and, if necessary, uses this configuration. If the DIP switches are deactivated, the slave reads the last configuration from its memory and configures itself using these settings. It retains the last configuration.

The slave part in the higher-level INTERBUS system is now ready-to-operate, but it does not yet have a communication path to the lower-level master and the host system.

By this time the master has also completed the selftest. The master does not have a parameterization stored in its memory. The master now reads the configuration of the slave and establishes a communication path to the slave expansion module and the host system. The master is not parameterized and therefore the lower-level INTERBUS system is not ready-to-operate.

Now the system coupler can be parameterized and configured by the higher-level INTERBUS system or the host system. This can be done using firmware services or *IBS CMD SWT G4 E* software.

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5.1.3 Starting Up With Parameterization of the Master

If the host system and the voltage supply for the slave expansion module are switched on, the slave and master part carry out a selftest independently from each other.

Next, the slave checks whether the DIP switches are activated and, if necessary, uses this configuration. If the DIP switches are deactivated, the slave reads the last configuration from its memory and configures itself using these settings. It retains the last configuration.

The slave part in the higher-level INTERBUS system is now ready-to-operate, but it does not yet have a communication path to the lower-level master and the host system.

By this time the master has also completed the selftest. The master has a parameterization stored in its memory and now reads this parameterization.

There are three options:

– Master startup
– Master/slave startup
– Slave only startup

Master startup

With master startup the parameterization contains no information for the configuration of the slave expansion module. After the master has been configured, the communication path to the host system is established and the lower-level INTERBUS system is ready-to-operate.

The configuration of the slave expansion module does not change.

Master/slave startup

With master/slave startup the parameterization contains data for the configuration of the master and the slave expansion module. The master is parameterized and the parameterization is sent to the slave expansion module, where it is executed and saved. A communication path is established between the master, slave, and host system.

The system coupler is fully ready-to-operate.

Even if you do not want to change the configuration of the slave expansion module of the system coupler, this configuration data must be transferred, otherwise only the master part of the system coupler is started up and no communication can take place between the two INTERBUS systems (see "Master startup").

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Only change the configuration of the slave expansion module when the higher-level INTERBUS system is in the STOP state. If the configuration is changed during bus operation, a bus error occurs in the higher-level INTERBUS system and the bus stops. The change is executed as soon as the lower-level master part switches to the "ACTIVE" state.

Slave only startup

Slave only startup is a special instance of master/slave startup where only the lower-level INTERBUS system is not started up. This startup behavior can be used for test and system startup purposes.

With slave startup no lower-level INTERBUS is required because the lower-level master switches to the "ACTIVE" state and not the "RUN" state after parameterization.

Only change the configuration of the slave expansion module when the higher-level INTERBUS system is in the STOP state. If the configuration is changed during bus operation, a bus error occurs in the higher-level INTERBUS system and the bus stops. The change is executed as soon as the lower-level master part switches to the "ACTIVE" state.

5.1.4 Changing the Configuration Using Firmware Services

The tasks, which DIP switches 1 ... 9 on the slave expansion module (see section 3.3.3 on page 3-15) use to configure the slave expansion module can also be carried out by firmware services. To do this you must add the appropriate service to the startup sequence of the system coupler. The "Set value" service can be used to write the values.

The "Read value" service can be used to determine the current configuration and thus read back the values.

A detailed description of the firmware services can be found in the "Firmware Services and Error Messages" User Manual (IBS SYS FW G4 UM E, Order No. 27 45 18 5), which is part of the System Manual.

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"Set_Value" Service

Task: This service assigns new values to INTERBUS system parameters (variables). The following additional system parameters are defined for system couplers:

Table 5-1 Additional system parameters for system couplers

Variable ID	System Parameter	Value/Note
0110_{hex}	Slave_ID_Code	Bit 2 corresponds to DIP 3 Bit 3 corresponds to DIP 4 Bit 4 corresponds to DIP 5 Bit 5 corresponds to DIP 6
	Process data length	Bit 0 corresponds to DIP 1 Bit 1 corresponds to DIP 2
$011D_{hex}$	Reporting I/O errors and setting the baud rate	Bit 0 corresponds to DIP 7 Bit 1 corresponds to DIP 8 Bit 2 corresponds to DIP 9

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Syntax: **Set_Value_Request** **0750_{hex}**

Word 1	Code	
Word 2	Parameter_Count	
Word 3	Variable_Count	
Word 4	Variable_ID	1st parameter
Word 5	Value	
...	...	
	Variable_ID	2nd parameter
	Value	
	...	
	...	
	Variable_ID	nth parameter
	Value	
	...	
Bit	15 0	

Key:

Code: 0750_{hex} Command code of the service request

Parameter_Count: Number of subsequent words
The value depends on the number and length of the system parameters. The length of the system parameter (16 words, maximum) is specified in the third hexadecimal position (bits 8 ... 11) of the *Variable_ID* parameter.

Variable_Count: The number of system parameters to which new values are to be assigned

Variable_ID: ID of the system parameter to which new values are to be assigned (see Table 5-1)

Value: The new value of the system parameter

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Syntax: **Set_Value_Confirmation** **8750_{hex}**

Positive message

Word 1	Code
Word 2	Parameter_Count
Word 3	Result

Negative message

Word 1	Code
Word 2	Parameter_Count
Word 3	Result
Word 4	Add_Error_Info

Bit	15 0

Key:

Code: 8750_{hex} Message code of the service confirmation

Parameter_Count: Number of subsequent words

with a positive message:
0001_{hex} 1 parameter word

with a negative message:
0002_{hex} 2 parameter words

Result: Result of the service processing

0000_{hex} Indicates a positive message. The controller board executed the service successfully.

$xxxx_{hex}$ Indicates a negative message. The controller board could not execute the service successfully. The *Result* parameter indicates why the service could not be executed.

Add_Error_Info: Additional information on the error cause

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"Read_Value" Service

Task: This service can be used to read INTERBUS system parameters (variables).

Table 5-2 Additional system parameters for system couplers

Variable ID	System Parameter	Value/Note
$011E_{hex}$	Slave_ID_Code	Bit 0 corresponds to DIP 1 Bit 1 corresponds to DIP 2
	Process data length	Bit 2 corresponds to DIP 3 Bit 3 corresponds to DIP 4 Bit 4 corresponds to DIP 5 Bit 5 corresponds to DIP 6
	Reporting I/O errors and setting the baud rate	Bit 6 corresponds to DIP 7 Bit 7 corresponds to DIP 8 Bit 8 corresponds to DIP 9 Bit 9 corresponds toDIP 10

Syntax: **Read_Value_Request** **0351_{hex}**

Word 1	Code	
Word 2	Parameter_Count	
Word 3	Variable_Count	
Word 4	Variable_ID	1st parameter
Word 5	Variable_ID	2nd parameter
...	...	
	Variable_ID	nth parameter

Bit	15 0

Key:

Code:	0351_{hex} Command code of the service request
Parameter_Count:	Number of subsequent words $xxxx_{hex}$ = 1 + *Variable_Count*
Variable_Count:	Number of system parameters to be read
Variable_ID:	ID of the system parameter to be read

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Syntax: **Read_Value_Confirmation** **8351_{hex}**

Positive message

Word 1	Code	
Word 2	Parameter_Count	
Word 3	Result	
Word 4	Variable_Count	
Word 5	Variable_ID	1st system parameter
...	Value	
	...	
	Variable_ID	2nd system parameter
	Value	
	...	
	...	
	Variable_ID	nth system parameter
	Value	
	...	

Negative message

Word 1	Code
Word 2	Parameter_Count
Word 3	Result
Word 4	Add_Error_Info

Bit	15 0

Key:

Code: 8351_{hex} Message code of the service confirmation

Parameter_Count: Number of subsequent words

with a positive message:

$xxxx_{hex}$ The value depends on the number and length of the system parameters. The length of the system parameter (16 words, maximum) is specified in the third hexadecimal position (bits 8 ... 11) of the *Variable_ID* parameter.

with a negative message:

0002_{hex} 2 parameter words

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Result:	Result of the service processing 0000_{hex} Indicates a positive message. The controller board executed the service successfully. $xxxx_{hex}$ Indicates a negative message. The controller board could not execute the service successfully. The *Result* parameter indicates why the service could not be executed.
Variable_Count:	Number of read system parameters
Variable_ID:	ID of the read system parameter
Value:	Value of the system parameter
Add_Error_Info:	Additional information on the error cause

5.1.5 Changing the Configuration Using IBS CMD SWT G4 E

To change the configuration of the system couplers in *IBS CMD SWT G4 E*, select the controller board and right click to open the context menu. In "Settings" you can now configure the system coupler to meet your requirements.

The "Parameterization Memory... Save ..." function can then be used to send the configuration to the system coupler and store it as the default configuration.

For detailed information on operation of IBS CMD SWT G4 E, please refer to the online help.

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5.2 System Behavior and Diagnostics

The system coupler has specific system behavior for the various states of the lower-level and higher-level INTERBUS system.

5.2.1 Reset Behavior

The following overview shows the behavior of the system coupler in the various reset situations:

Master reset:	An I/O error $0BB1_{hex}$ is reported to the higher-level system.
Slave reset:	A message is sent to the lower-level master and an entry is made in the slave diagnostic register.
Host system reset:	An I/O error $0BB1_{hex}$ is reported to the higher-level system.

The module has diagnostic registers for both the slave and the master part. These registers are maintained separately.

It is possible to assign the diagnostic register of the lower-level master to the data area of the slave part. In this way, the higher-level master can detect the state of the lower-level INTERBUS system without using the host PC. To do this, the diagnostic status register and the diagnostic parameter register of the master must be assigned to addresses in the same memory and these addresses must be accessed using the slave input data.

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5.2.2 Message Behavior

Messages From the Master to the Slave:

– If the host PC is switched on or off (reset), an I/O error $0BB1_{hex}$ is sent to the higher-level master.
– If the master is reset using the "Reset controller board" service, an I/O error $0BB1_{hex}$ is sent to the higher-level master.
– If the master is reset using the reset button, an I/O error $0BB1_{hex}$ is sent to the higher-level master.

In all three cases mentioned above, the outputs to the slave are reset during the reset phase. The outputs are only updated again when the master switches to the "ACTIVE" state.

– In the event of a controller error in the master part of the system coupler, an I/O error $0BB1_{hex}$ is sent to the higher-level master. The outputs to the slave part are reset.
– If the host PC reports a "SysFail" (e.g., driver deactivated), an I/O error $0BC0_{hex}$ appears in the higher-level system. The outputs to the slave part are reset.

Messages Sent to the Higher-Level INTERBUS Master

An I/O error is reported if the master firmware cannot communicate (for example, reset, controller error, master operating in master only operation, etc.):

– The PC or the driver and controller board operate during the reset. The I/O error is reset when the system coupler switches back to the "READY" state without a SysFail.
– The master part reports a controller error, the watchdog or SysFail is triggered, and communication with the host is interrupted by the module.

If you want to report other states you can map them to the host system using the application program.

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5.2.3 Data Behavior

Alarm Stop in the Lower-Level INTERBUS System

In the event of an alarm stop in the lower-level INTERBUS system, the process data to the higher-level master (slave output data) is reset.

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A Technical Appendix

A 1 Basic Functions of the Driver (Device Driver Interface, DDI)

Table A-1 Basic functions of the driver (Device Driver Interface, DDI)

Function	Task
DDI_DevOpenNode	Opens a data channel to a node
DDI_DevCloseNode	Closes a data channel to a node
DDI_MXI_SndMessage	Writes a message to the Multi-Port Memory *
DDI_MXI_RcvMessage	Reads a message from the Multi-Port Memory *
DDI_DTI_ReadData	Reads data from the Multi-Port Memory
DDI_DTI_WriteData	Writes data to the Multi-Port Memory
GetSysFailRegister	Reads the content of the SysFail register
EnableWatchDog	Switches a watchdog on
TriggerWatchDog	Triggers a watchdog
GetWatchDogState	Reads the status of a watchdog
ClearWatchDog	Resets the status of a watchdog
SetWatchDogTimeout	Sets the timeout value and switches the watchdog on
GetWatchDogTimeout	Reads the timeout value
GetIBSDiagnostic	Evaluates the operating state of the INTERBUS controller board
GetSlaveDiagnostic	Reads the slave diagnostic register
DDIGetInfo	Reads the driver version (Windows NT)

* Messages corresponding to the firmware commands for the control and parameterization of INTERBUS or PCP (Peripheral Communication Protocol) to intelligent devices in the INTERBUS system.

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A 2 Comparison of Polymer Fibers and HCS Fibers

Table A-2 Comparison of polymer fibers and HCS fibers

	Polymer Fibers	HCS Fibers
Wavelength	665 nm, typical	665 nm, typical
Optical output power	-8.9 dBm (129 µW), minimum	-22.2 dBm (6.0 µW)
Optical responsivity	-26.4 dBm (2.3 µW), min.	-28.4 dBm (1.4 µW)
Optical overrange	-2.75 dBm (530 µW), max.	> -8 dBm (158 µW)
Power reduction through wavelength drift	1 dB, typical (50 m [164.04 ft.] cable length)	Negligible
System reserve	> 3 dB	> 3 dB
Transmission length -20°C to 55°C (-4°F to 131°F)	1 m to 50 m (3.28 ft. to 984.25 ft.), min. (fiber attenuation 260 dB/km, LED source with 672 nm) 1 m to 60 m (3.28 ft. to 196.85 ft.), typical (fiber attenuation 230 dB/km)	1 m to 300 m (3.28 ft. to 984.25 ft.), min. (fiber attenuation 10 dB/km, LED source with 665 nm) 1 m to 400 m (3.28 ft. to 1312.34 ft.), typical (fiber attenuation 8 dB/km)
Bit error rate	10^{-9}	10^{-9}
Core diameter	980 µm	200 µm
Cladding diameter	1000 µm	230 µm
Numerical aperture	0,47	> 0,36
Attenuation for 660 nm measured with LED source	< 220 dB/km	< 10 dB/km
Connector type	FSMA (type 905) according to IEC 874-2 (St.6/89) DIN 47258 (St. E 11/89)	FSMA (type 905) according to IEC 874-2 (St.6/89) DIN 47258 (St. E 11/89)

Phoenix Contact offers pre-assembled bus cables to minimize assembly times. The cables are available in various lengths.

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A 3 IBS PCI SC/I-T Technical Data

Voltage Supply	
$V_{S,\ controller}$ (PC supply)	5 V DC ±5%
Power consumption	Approximately 3.5 W, typical

Host Interface	
Connection method	Direct edge connection
Bus system	PCI 32 bits/33 MHz/5 V
Data width	8, 16 or 32 bits
Address area	256-kbyte memory window 16-kbyte I/O window

Remote Bus Interface	
Connection method	9-pos. D-SUB female connector
Interface type	RS-422
Electrical isolation	Yes (test voltage 0.5 kV)

Diagnostic Interface	
Connection method	6-pos. Mini-DIN female connector (PS/2)
Interface type	RS-232
Transmission rate	9600 baud

Ambient Conditions	
Temperature (according to EN 60204-1)	Operation: 0°C to 55°C (32°F to 131°F), Storage and transport: -25°C to 75°C (-13°F to 167°F)
Humidity (according to EN 60204-1)	Storage and operation: 75% on average, 85% occasionally (DIN 40040); no condensation
Air pressure	Operation: 860 hPa to 1080 hPa (up to 1500 m [4921 ft.] above sea level) Storage and transport: 660 hPa to 1080 hPa (up to 3500 m [11483 ft.] above sea level)
Vibration	2g, criterion 1 according to IEC 68-2-6

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Conformance With EMC Directive 89/336/EEC

Noise Immunity Test According to EN 50082-2		
Electrostatic discharge (ESD)	EN 61000-4-2 IEC 61000-4-2: 1995	Criterion B 6 kV contact discharge 8 kV air discharge
Electromagnetic fields	EN 61000-4-3 IEC 61000-4-3: 1996	Criterion A Field strength: 10 V/m
Fast transients (burst)	EN 61000-4-4/ IEC 61000-4-4: 1995	Criterion B Signal/data lines: 2 kV
Surge test	EN 61000-4-5 IEC 61000-4-5: 1995	Criterion B Signal/data lines: 1 kV
Conducted interference	EN 61000-4-6 IEC 61000-4-6: 1996	Criterion A Test voltage 10 V
Noise Emission Test According to EN 55011 (Industrial Area)		
Emitted interference	EN 55011	Class A

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A 4 IBS PCI SC/RI-LK Technical Data

General Data	
Order Designation	IBS PCI SC/RI-LK
Order No.	27 30 18 7
Dimensions (master part and slave part)	168 mm x 107 mm (6.614 in. x 4.213 in.)

Voltage Supply	
$V_{S, controller}$ (PC supply)	5 V DC ±5%
$V_{S, slave}$(PC supply)	20 V DC to 30 V DC, 24 V DC, typical (ambient class 1)
Residual ripple	0.5 V_{pp}
Power consumption	Master: 3.0 W Slave: 3.2 W

Host Interface	
Connection method	Direct edge connection
Bus system	PCI 32 bits/33MHz/5 V
Data width	8, 16 or 32 bits
Address area	256-kbyte memory window
Connection method	Direct edge connection

Remote Bus Interfaces	
Connection method	Optical fiber, 2 F-SMA connectors according to IEC 874-2

Diagnostic Interface	
Connection method	6-pos. Mini-DIN female connector (PS/2)
Interface type	RS-232
Transmission rate	9600 baud

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Ambient Conditions	
Temperature (according to EN 60204-1)	Operation: 0°C to 55°C (32°F to 131°F), Storage and transport: -25°C to 75°C (-13°F to 167°F)
Humidity (according to EN 60204-1)	Storage and operation: 75% on average, 85% occasionally (DIN 40040); no condensation
Air pressure	Operation: 860 hPa to 1 080 hPa (up to 1500 m [4921 ft.] above sea level) Storage and transport: 660 hPa to 1080 hPa (up to 3500 m [11483 ft.] above sea level)
Vibration	2g, criterion 1 according to IEC 68-2-6

Conformance With EMC Directive 89/336/EEC

Noise Immunity Test According to EN 50082-2		
Electrostatic discharge (ESD)	EN 61000-4-2 IEC 61000-4-2: 1995	Criterion B 6 kV contact discharge 8 kV air discharge
Electromagnetic fields	EN 61000-4-3 IEC 61000-4-3: 1996	Criterion A Field strength: 10 V/m
Fast transients (burst)	EN 61000-4-4/ IEC 61000-4-4: 1995	Criterion B Signal/data lines: 2 kV
Surge test	EN 61000-4-5 IEC 61000-4-5: 1995	Criterion B Signal/data lines: 1 kV
Conducted interference	EN 61000-4-6 IEC 61000-4-6: 1996	Criterion A Test voltage 10 V
Noise Emission Test According to EN 55011 (Industrial Area)		
Emitted interference	EN 55011	Class A

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A 5 IBS PCI SC/RI/I-T Technical Data

General Data	
Order Designation	IBS PCI SC/RI/I-T
Order No.	27 30 08 0
Dimensions (master part and slave part)	168 mm x 107 mm (6.614 in. x 4.213 in.)

Voltage Supply	
$V_{S, controller}$ (PC supply)	5 V DC ±5%
$V_{S, slave}$(PC supply)	20 V DC to 30 V DC, 24 V DC, typical (ambient class 1)
Residual ripple	0.5 V_{pp}
Power consumption	Master: 3 W Slave: 3.5 W

Host Interface	
Connection method	Direct edge connection
Bus system	PCI 32 bits/33MHz/5 V
Data width	8, 16 or 32 bits
Address area	256-kbyte memory window
Connection method	Edge connection

Remote Bus Interfaces	
Connection method	9-pos. D-SUB female connector
Interface type	RS-422
Electrical isolation	Yes (test voltage 0.5 kV)

Diagnostic Interface	
Connection method	6-pos. Mini-DIN female connector (PS/2)
Interface type	RS-232
Transmission rate	9600 baud

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Ambient Conditions	
Temperature (according to EN 60204-1)	Operation: 0°C to 55°C (32°F to 131°F), Storage and transport: -25°C to 75°C (-13°F to 167°F)
Humidity (according to EN 60204-1)	Storage and operation: 75% on average, 85% occasionally (DIN 40040); no condensation
Air pressure	Operation: 860 hPa to 1 080 hPa (up to 1500 m [4921 ft.] above sea level) Storage and transport: 660 hPa to 1080 hPa (up to 3500 m [11483 ft.] above sea level)
Vibration	2g, criterion 1 according to IEC 68-2-6

Conformance With EMC Directive 89/336/EEC

Noise Immunity Test According to EN 50082-2		
Electrostatic discharge (ESD)	EN 61000-4-2 IEC 61000-4-2: 1995	Criterion B 6 kV contact discharge 8 kV air discharge
Electromagnetic fields	EN 61000-4-3 IEC 61000-4-3: 1996	Criterion A Field strength: 10 V/m
Fast transients (burst)	EN 61000-4-4/ IEC 61000-4-4: 1995	Criterion B Signal/data lines: 2 kV
Surge test	EN 61000-4-5 IEC 61000-4-5: 1995	Criterion B Signal/data lines: 1 kV
Conducted interference	EN 61000-4-6 IEC 61000-4-6: 1996	Criterion A Test voltage 10 V
Noise Emission Test According to EN 55011 (Industrial Area)		
Emitted interference	EN 55011	Class A

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A 6 Ordering Data

Description	Order Designation	Order No.
Controller board	IBS PCI SC/I-T	27 25 26 0
System coupler	IBS PCI SC/RI/I-T	27 30 08 0
System coupler with optical fiber connections	IBS PCI SC/RI-LK	27 30 18 7
RS-232 cable	PRG CAB MINI DIN	27 30 61 1
Driver and documentation CD for the controller board	CD IBS PCI SC	27 33 00 3
System package with controller board, mounting set, user manual including driver software and IBS CMD SWT G4 E operating software	IBS PCI SC SYSKIT	27 32 98 1
"Configuring and Installing INTERBUS" User Manual	IBS SYS PRO INST UM E	27 43 80 2
IBS CMD SWT G4 E operating software	IBS CMD SWT G4 E	27 21 44 2
INTERBUS OPC server	IBS OPC SERVER	27 29 12 7

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